

Appln. No. 09/840,193
Amendment dated May 15, 2007
Reply to Office Action of February 21, 2007

REMARKS/ARGUMENTS

Reconsideration of the present application, as amended, is respectfully requested.

The February 21, 2007 Office Action and the Examiner's comments have been carefully considered. In response, claims are amended and added, and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

ALLOWABLE SUBJECT MATTER

The Examiner's indication that claim 35 would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims is acknowledged.

Claim 35 is not rewritten in independent form at this time. Applicant does, however, reserve the right to present claim 35 in independent form if the claim upon which claim 35 is dependent is ultimately held to be unpatentable.

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PRIOR ART REJECTIONS

In the Office Action claims 2-5 and 33 are rejected under 35 USC 103(a) as being unpatentable over USP 6,335,980 (Armato, III et al.) in view of USP 5,825,910 (Vafai). Claims 8 and 34, while not specifically included in the rejection of claims 2-5 and 33, also appear to be rejected as being obvious over Armato, III et al. in view of Vafai since these claims are discussed in the body of the rejection. Claims 6 and 7 are rejected under 35 USC 103(a) as being unpatentable over the combination of Armato, III et al. and Vafai, and further in view of USP 6,493, 458 (Yasui et al.). Claims 6 and 7 are rejected as being obvious over Armato, III et al. in view of USP 6,493,458 (Yasui et al.). Claim 9 is rejected under 35 USC 103(a) as being unpatentable over Armato, III et al., and further in view of USP 6,594,380 (Shinbata).

In response, claim 33 is amended to more clearly define the present claimed invention over the cited references.

As indicated in amended claim 33, in the present claimed invention, a radiation image processing apparatus for conducting a gradation conversion process for radiation image data of a radiographed body part includes an object region extracting section that receives a set of two-dimensionally-arranged radiation image data including the radiation image data of the radiographed body part and extracts an object region formed by

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the radiation image data of the radiographed body part from the set of two-dimensionally-arranged radiation image data. The device also includes a contour recognizing section having contour type classification criteria data for each of a plurality of predetermined-different contour types corresponding to a plurality of different kinds of body parts including a chest, an abdomen and a leg, wherein the contour recognizing section recognizes a contour of the extracted object region, and determines to which one of the plurality of different contour types the recognized contour belongs based on the data of contour type classification criteria. The device further includes an image processing section that has a plurality of different image processing conditions for the gradation conversion process, selects one of the plurality of different image processing conditions in accordance with the determined one of the plurality of different contour types and conducts the gradation conversion process for the radiation image data of the radiographed body part based on the selected one of the plurality of different image processing conditions.

As described at page 3 lines 10-15 of the present application, in a radiation image processing apparatus used for diagnoses, for the purpose of expressing radiation images with gradation that is appropriate for diagnoses, it is desirable to

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conduct a gradation conversion process automatically for a radiation image of a body part obtained on the apparatuses so that an interest portion of the body part to be looked by a doctor (a body part of interest, a region of interest) may be easily observed. However, the number of kinds of body parts generally is 100 or more, and it is complicated for a radiographer to input an image processing condition for the gradation conversion process for each radiographed body part.

The present claimed invention determines to which one of the plurality of different contour types the contour of the object region of the radiographed body part belongs, selects one of the plurality of different image processing conditions for the gradation conversion process in accordance with the determined one of the plurality of different contour types and conducts the gradation conversion process for the radiation image data of the radiographed body part based on the selected one of the plurality of image processing conditions (see the present application from page 68 line 23 to page 69 line 2, and from page 85 line 17 to page 86 line 15, inter alia).

As a result, the radiographer can be relieved from the above complicated job to input an image processing condition for the gradation conversion process for each radiographed body part, and a doctor can easily observe a region of interest for each

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different body part even if 100 or more body parts are to be examined.

On page 3 lines 20-26 of the Office Action, the Examiner admits that Armato does not expressly disclose that the identified contours are processed any differently as a result of their classification. In order to bridge the gap between the present claimed invention and Armato, III et al., the Examiner asserts that Vafai discloses identifying contour sections A, B, and C, which use 3 different "image processing conditions" to process these contour sections.

However, as can be seen from Fig. 3 of Vafai, Vafai merely teaches separating an image of a breast into three regions A, B and C in accordance with a computation of gradients A, B, C and segmentation procedure 44. Vafai teaches obtaining a skinline and displays a breast image with the skinline outline (see Fig. 2 of Vafai).

Accordingly, similar to Armato, Vafai does not disclose, teach or suggest a contour recognizing section as recited in claim 33 which has contour type classification criteria data for each of a plurality of predetermined-different contour types corresponding to a plurality of different kinds of body parts including a chest, an abdomen and a leg.

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Furthermore, similar to Armato, Vafai does not disclose, teach or suggest an image processing section which has a plurality of different image processing conditions for the gradation conversion process, selects one of the plurality of different image processing conditions in accordance with the determined one of the plurality of different contour types and conducts the gradation conversion process for the radiation image data of the radiographed body part based on the selected one of the plurality of different image processing conditions.

Consequently, even if Armato is taken in combination with Vafai, the present invention recited in claim 33 would not have been obvious to one of ordinary skill in the art.

That is, the present claimed invention as defined by amended claim 33 is patentable over Armato, III et al. and Vafai because the references do not disclose, teach or suggest a radiation image processing apparatus which includes:

a contour recognizing section having contour type classification criteria data for each of a plurality of predetermined-different contour types corresponding to a plurality of different kinds of body parts including a chest, an abdomen and a leg, wherein the contour recognizing section recognizes a contour of the extracted object region, and determines to which one of the plurality of different contour types the recognized contour belongs based on the data of the contour type classification criteria; and/or

an image processing section having a plurality of different image processing conditions for the gradation conversion processing, which selects one

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of the plurality of different image processing conditions in accordance with the determined one of the plurality of different contour types and conducts the gradation conversion process for the radiation image data of the radiographed body part based on the selected one of the plurality of different image processing conditions (see claim 33, lines 14-30).

None of the other references of record close the gap between the present claimed invention as defined by independent claim 33 and Armato, III et al. taken in combination with Vafai. Therefore, claim 33 is patentable over all of the references of record under 35 USC 102 as well as 35 USC 103.

Claims 2-9, 34 and 35 are either directly or indirectly dependent on claim 33 and are patentable over the cited references in view of their dependence on claim 33 and because the references do not disclose, teach or suggest each of the limitations set forth in the dependent claims.

In view of the foregoing, claims 2-9 and 33-35 are in form for immediate allowance, which action is earnestly solicited.

NEW CLAIM

New dependent claim 36 is added to the application. Claim 36 is dependent on claim 33 and further defines the radiation image processing apparatus as including a control section to control the object region extracting section, the contour recognizing section and the image processing section so as to

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conduct the gradation conversion process automatically. Claim 36 is patentable over the references of record in view of its dependence on claim 33 and because the references do not disclose, teach or suggest each of the limitations set forth in claim 36.

The highest number of claims for which payment was previously made in connection with this application is six (6) independent claims and thirty-two (32) total claims. After entry of this Amendment, the present application includes one (1) independent claim and twelve (12) total claims. Therefore, it is respectfully submitted that no additional fees are due for the presentation of claim 36. However, if any additional fees are due, please charge or credit Deposit Account No. 06-1378 for such sum.

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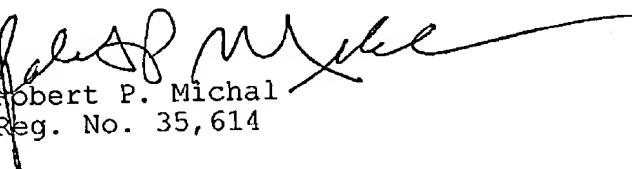
Entry of this amendment, allowance of the claims, and the passing of this application to issue are respectfully solicited.

If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

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If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,


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